

Description

Apparatus and method for preventing the bolt carrier of a firearm from moving forward after firing the last round of ammunition, and signaling when the firearm has run out of ammunition.

BACKGROUND OF INVENTION

[0001] The AK47-type firearms have a number of weaknesses. One of these is the lack of a bolt stop or bolt catch feature that prevents the bolt and the bolt carrier assembly from moving forward to battery upon firing and ejecting the last round from the ammunition feeding device or magazine. This shortcoming often leads to the users unanticipated running out of ammunition unless the user counts the number of bullets fired from the magazine. In most cases, this results in a dry fire, where the trigger is pulled

on an empty chamber. This slows down the operators response time to refresh the firearms magazine.

[0002] The unmodified rifle and its operation is fully described in a publication entitled The AK-47 Assault Rifle edited by Wyant La Mont (Normount Technical Publications, Wickenburg, Ariz., Copyright 1969 by Donald B. Mclean). This type of rifle is also described in the World patent NO. WO9905467. Therefore, its operation will not be described in detail here.

[0003] What is needed is a mechanism that can easily be added on a (AK47-type) firearm, which prevents the bolt carrier from moving forward upon firing/ejecting of the last round of ammunition and which provides a signal to the user to warn him/her that he/she has run out of ammunition.

SUMMARY OF INVENTION

[0004] Although this invention is described in conjunction with AK47-type firearms, other types of firearms may benefit from the present invention, and are not meant to be excluded from the scope of the present invention. AK-47-type firearms include, but are not limited to, the AKM, MAK-90, MAADI and Krinkov series firearms. These firearms commonly have a stamped steel (or machined

steel) receiver body, a removable single (or double) stack stamped steel (or molded plastic box magazine) with stamped steel (or molded plastic) magazine follower, and semi-automatic (or automatic) rate fire capability.

[0005] A mechanism in accordance with this invention automatically locks the bolt carrier in the semi-rearward position after having chambered, fired and ejected the last round from the magazine. This invention also allows the user to manually lock the bolt carrier in the semi-rearward position by use of a thumb release, and manually release the locked bolt carrier from the semi-rearward position to battery by the thumb release, with or without an empty or charged magazine installed in the receiver. Further, upon having locked the bolt carrier semi-rearward by the use of this invention, it also allows the magazine to be removed and replaced without releasing the bolt carrier. Furthermore, this invention allows the release of the bolt carrier when a fully charged magazine is installed, by pulling on the charging handle of the bolt carrier rearward until the bolt catch (or bolt stop) is disengaged. This allows the bolt carrier to move forward to battery, stripping a bullet from the magazine and chambering it. Also, this invention allows the manual release of the bolt carrier either with

the thumb release or the bolt carrier charging handle when there is no magazine installed, allowing the bolt carrier to move forward to battery.

[0006] The invention, therefore, provides a visual indication of the last cartridge fired by keeping the bolt carrier in the open or semi-rearward position, provides for quicker removal of empty magazine and installation of a fresh magazine, and allows quicker charging of the firearm by the use of an external thumb release.

BRIEF DESCRIPTION OF DRAWINGS

[0007] Fig.1. is a right elevation cut away of the receiver portion of the firearm showing the basic components of the present invention, the firing mechanism cocked and ready for firing the bolt catch mechanism in the retracted state, with magazine not installed.

[0008] Fig. 2 is the exploded isometric view of Fig. 1, showing the relationship of the bolt catch mechanism components with the firearm components and receiver. Magazine displaced from the receiver.

[0009] Fig 3. is the isometric view of a preferred embodiment of the present invention, shown separately from the firearm for added clarity. Receiver and fire control components are not shown.

[0010] Fig. 4. is the left elevation cutaway of the firearm showing the bolt catch mechanism in the retracted position with fully charged magazine installed. Firing mechanism components have been omitted for clarity, left wall removed, bolt carrier moving past the catch lever.

[0011] Fig 5. is the left elevation cutaway of the firearm showing the bolt catch mechanism in the elevated or engaged position with empty magazine installed. Left wall and firing mechanism components have been omitted for clarity.

DETAILED DESCRIPTION

[0012] Referring to Figs. 1, 2, the rifle includes a channel-shaped receiver 1 having a bottom wall 30, left wall 2, and right wall 3 and a rear block 25. Longitudinally sliding in the upper portion of the receiver 1 is a bolt carrier 13 (or slide), which is supported by means of flanges 12, 18 projecting from the inner surfaces of the side walls. The receiver walls 1,3 are also connected by means of a semi-permanent solid rivet 9. The trigger assembly includes a trigger 24 pivotally mounted to the receiver 1 by means of a removable pin 35 and having the usual projection for engagement by the trigger finger of an operator. A gas operated piston (not shown) of the bolt carrier 13 to move the latter rearward immediately upon firing of a cartridge.

A spiral return spring 29 returns the carrier assembly to its forward locked position after firing. The removable box magazine is comprised of the housing 5, in which is housed the magazine follower 4 which is constrained to move in the vertical direction by means of the inside envelope of the magazine housing 5. The magazine follower 4 is acted upon by an internal wire spring (not shown) also housed within the magazine housing 5. The magazine spring is constrained within the magazine by a removable magazine floor plate (not shown).

[0013] In a preferred embodiment, the invention is comprised of six major components as shown in Fig 2, 3. These are: the magazine follower 4, the magazine tab 26, sensor lever 19, catch lever 22, catch lever head 23, the return spring 8.

[0014] The sensor lever 19 with integral sensor tab 31, integral thumb release 32 protruding through the bottom of the receiver 1 in the area of the magazine well 27, pivotally mounted on a pin 21. The pin 21 is securely fastened to the inside left wall 2 of the receiver 3. The bolt catch lever 22 is pivotally mounted on the solid rivet 9, connecting the walls 2, 3 of the firearm. A catch return spring 8 which imparts a continuous counterclockwise torque (when

viewed in Fig. 1) on the catch lever 22, to prevent the catch lever 22 from rotating unless acted upon by the sensor lever 19. The magazine follower 4 is equipped with a tab 26, that remains retracted within the magazine housing until the last cartridge is fed into the chamber at which point the tab 26 rises through a longitudinal slot 34 in the top of the magazine housing 5. The sensor lever 19 and the catch lever 22 interact with each other via two sets of pins 14, 15 in the catch lever 22 and corresponding set of holes 16,17 in the sensor lever 19.

[0015] Upon imparting a clockwise rotation (when viewed in figures 3, 4, 5) on the sensor lever 19, rotating about pin 21, lever 19 engages the catch lever 22 through the interaction of the hole 16 in the sensor lever 19 and the corresponding pin 14 in the catch lever 22. This interaction results in the counter clockwise rotation of the catch lever 22, about the receiver rivet 9, on which it is mounted. In this condition the catch lever 22 is ready to engage the carrier 13.

[0016] The sensor lever 19 further engages the catch lever 22 through the interaction of a second hole 17 and a corresponding pin 15 in the catch lever 22. However, this set of hole 17 and pin 15 only engage each other when a

counter clockwise rotation (when viewed in figures 3, 4, 5) is imparted to the sensor lever 19, thereby imparting a clockwise rotation on the catch lever 22 about the receiver rivet 9 on which it is mounted. The resulting motion allows for the release of the stopped carrier 13. The pins 14, 15 are located in the catch lever 22 such that they do not ever simultaneously engage their respective holes 16,17 in the sensor lever 19.

[0017] LOCKING THE BOLT CARRIER IN THE SEMI-REARWARD POSITION AFTER HAVING FIRED THE LAST CARTRIDGE.

[0018] The description of operation will assume that a charged magazine has been installed into the firearm. After having fired and ejected the second to last cartridge, the carrier 13 moves forward under the action of the return spring 29 to chamber the last cartridge, at which point the magazine follower tab 26 also protrudes up through the magazine housing 5 by means of slot 34, imparting a clockwise rotation (when viewed in figures 3, 4, 5) on the sensor lever 19 pivotally mounted about pin 21, which in turn imparts a counter clockwise rotation of the catch lever 22 pivotally mounted on the receiver rivet 9, by way of the sensor hole 16 and catch pin 14. This presents the head 23 of the catch lever 22 in the path of the carrier 13 but is re-

stricted from further motion by the presence of the upper flange 12 projecting from the inner surface of the receiver wall 2. Upon firing a cartridge the carrier 13, by action of the chamber gases on the gas piston (not shown) of the carrier 13, moves longitudinally rearward, overriding the head 23 of the catch lever 22 and impacting the rear block 25 of the receiver 1. Under the action of the main spring 29 of the firearm, the bolt carrier 13 starts its forward motion. The head 23 of the catch lever 22, having been returned by to the upper flange 12 the spring forces of the magazine, inhibits the forward motion of the carrier 13 at the carrier notch 33, effectively locking the bolt carrier 13 in the semi-rearward position.

[0019] RELEASING THE BOLT CARRIER FROM THE SEMI-REARWARD POSITION, AFTER HAVING INSTALLED A CHARGED MAGAZINE, USING THE EXTERNAL THUMB RELEASE.

[0020] As the magazine spring (not shown) is compressed under the installation of cartridges within the magazine housing 5, the magazine follower 4 and tab 26 attached thereon, are retracted into the housing 5. Upon installing a fully charged magazine into the firearms magazine well 27, the magazine follower tab 26 no longer impinges on the sen-

sor lever 19. The absence of the magazine follower tab 26 allows for the return spring 8 to tend to impart a clockwise rotation (when viewed in figures 3, 4, 5) of the catch lever 22 about the receiver rivet 9 on which it rotates. Due to friction forces between the head 23 of the catch lever 22 and the notch 33 of the bolt carrier 13, the carrier 13 remains in the semi-rearward locked position. Upon manually imparting a counter clockwise rotation on the thumb release 32 protruding through the magazine well 27, a clockwise torque is applied to the catch lever 22 through the sensor hole 17 and corresponding catch lever pin 15. Enough force is applied to the thumb release 32 and sensor lever 19 to overcome the friction forces between the head 23 of the catch lever 22 and the carrier 13. Upon rotating the catch lever 22 out of the way of the carrier 13, the carrier 13 is allowed to move forward under the force of the main spring 29. As the carrier 13 moves forward to battery, the bolt face (not shown) impacts the next cartridge 10 presented by the magazine and chambers it.

[0021] **RELEASING THE BOLT CARRIER FROM THE SEMI-REARWARD LOCKED POSITION USING THE CARRIER INTEGRAL CHARGING HANDLE.**

[0022] Upon having removed the empty magazine, or having in-

stalled a fully charged magazine, the magazine follower tab 26 no longer impinges on the sensor lever 19. The absence of the magazine follower tab 26 allows for the catch lever 22 return spring 8 to tend to impart a clockwise rotation (when viewed in figures 3, 4, 5) on the catch lever 22 about the receiver rivet 9 on which it rotates. Due to friction forces between the catch lever 22 head 23 and bolt carrier notch 33, the bolt carrier 13 remains in the semi-rearward locked position. The carrier may be released from this semi-rearward locked position by use of the carrier charging handle 28. As the charging handle 28 is manually moved rearward, the clockwise torsion applied by the catch return spring 8 onto the catch lever 22, allows the catch lever 22 to be retracted as soon as the friction forces are removed by the separation of the carrier 13 and the head 23 of the catch lever 22. Releasing the charging handle 28 allows the bolt carrier 13 to rapidly move forward under the force of the return spring 29 and locking the bolt within the breach.